OBSERVATIONS REGARDING THE INFLICTION OF THE DEATH PENALTY BY ELECTRICITY.

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(*Read April 23, 1908.*)

A great variety of methods of inflicting the death penalty has been devised by the inventive mind of man. The earlier forms are chiefly characterized by cruelty, by an intense and passionate desire to wreak vengeance and inflict pain upon the condemned and to instill terror into the minds of onlookers. I will not review the ancient methods in detail. There is the *burning at the stake* by the Romans, Jews, ancient Britons, Chinese and by the Spanish Inquisition; *beating with clubs* in Greece and many African countries; *beheading* by axe and block, the sword and the guillotine; *blowing from a cannon,* either by lashing the condemned to the muzzle or by thrusting him into it as a part of the charge; *boiling* in water, oil, melted sulphur, melted lead; *breaking on the wheel; burial alive; crucifixion,* a lingering method in which death was sometimes hastened by the thrust of a spear or a blow with a club; *crucifrangium,* inflicted on Roman slaves and Christian martyrs by laying the legs of the condemned upon an anvil and fracturing the bones with a heavy hammer; *decimation,* used upon mutinous regiments by shooting every tenth man; *dichotomy* or bisecting the body with a saw; *dismemberment; drawing and quartering; drowning; exposure to wild beasts; flaying alive; flogging; knouting; garroting; impalement;* the *"Iron Maiden"; "peine forte et dure"; poisoning; pounding in a mortar; precipitation* from a great height; the *rack; running the gauntlet; shooting; stabbing; stoning; strangling; suffocating*— in short, men have exercised their utmost ingenuity in devising means for inflicting cruel torture and horrible mutilation upon their victims.

As is well known, more than two hundred offenses were punishable with death in England not so very long ago. In modern times the penalty is now universally limited to murder, treason, piracy and

military offenses. To the credit of William Penn and his companions it may be recorded that in 1675, when they founded Pennsylvania, the statutes prescribing death for all sorts of offenses, grave and trivial, were left behind in darkest England with its Newgate and London Tower, and the only one retained was that of death for aggravated cases of murder.

Electrocution.

In the childhood of the human race lightning and thunder played an important part in the religion and the mental life of the various peoples. Jupiter ruled the world by his thunderbolts. The Norse god Thor with mighty arm wielded the hammer of lightning in combat with the enemies of the gods. Every ancient race and tribe has been awed into humble submission before the powerful divinities imagined to preside among the clouds by this fascinating phenomenon of nature. It is even yet feared by man, for is not its deadliness and its destructiveness demonstrated on every hand?

It is now more than a century and a half ago that Benjamin Franklin, accompanied by his son, went to a field in the neighborhood of Philadelphia as a thunder-storm was approaching and by his famous kite experiment discovered that lightning was, as he shrewdly had surmised, in all respects similar to the frictional electricity which man had produced artificially. In 1760 Franklin erected the first lightning rod upon the house of a merchant named West. Although more than five hundred persons are killed and over eight hundred are injured annually in the United States, Franklin's invention, wherever used, has saved countless lives and vast amounts of property. That the sage Franklin ever foresaw the likelihood of employing this death-dealing and mysterious force in the infliction of capital punishment is apparently not on record.

Electrocution (more properly electrothanasia), compounded from "electro-execution," is the popular name for the infliction of the death penalty by passing through the body of the condemned a current of electricity of sufficient intensity to cause death. The method was first adopted by New York State in 1888 by a law which became effective on January 1, 1889, and which provides how many persons may witness the execution, that a post-mortem examination of the

body of the convict be performed and that the body, unless claimed by relatives, be interred in the prison cemetery with a sufficient quantity of quicklime to consume it.

The first criminal to be executed by electricity was William Kemmler, on August 6, 1890, at Auburn Prison. Since that time over one hundred murderers have been executed in New York State and the method has been adopted by Ohio (1896), Massachusetts (1898), New Jersey (1907), and Virginia (1907–8).

Reports on the earlier cases have been published by Drs. Carlos F. MacDonald, E. C. Spitzka, E. W. Holmes, and with reference to nerve-cell changes, by P. A. Fish.

My own observations are based upon thirty-one electrocutions (in the last six and one half years) at Sing Sing Prison, Auburn Prison, Dannemora Prison and Trenton (State Penitentiary). Of these twenty-five came to autopsy at my hands.

The apparatus consists of a stationary engine, an alternating dynamo capable of generating 2,000 volts, a "death-chair" with adjustable head-rest, binding straps and adjustable electrodes. [At Trenton a 2,400-volt current is taken from the public service wire and lowered to the desired tension by a rheostat.]

The voltmeter, ammeter and switchboard controlling the current is located in the execution-room; the dynamo-room is communicated with by electric signals. Before each execution the apparatus is thoroughly tested. When everything is in readiness the criminal is brought in unfettered and usually unassisted, and seats himself in the chair. His head, chest, arms and legs are secured by broad straps, an electrode thoroughly moistened with saturated salt-solution is affixed to the head, another to the calf of one leg, both electrodes being molded so as to assure good contact. The head is not shaved as is popularly thought.

The application of the current is usually as follows: The contact is made with a high potential (1,800 volts) for 5–7 seconds, reduced to 200–250 volts until a half minute has elapsed; raised to high voltage for 3–5 seconds, again reduced to low voltage until one minute has elapsed, when it is again raised to the high voltage for a few seconds and the contact is broken. The ammeter usually

shows that from seven to ten ampères have passed through the criminal's body.

A second or even a third brief contact is sometimes made, partly as a precautionary measure, but more to completely abolish reflexes in the dead body.

The time consumed by the strapping-in process is usually about forty-five seconds and the first contact is made a few seconds later. In all about 60–70 seconds elapse from the moment the convict leaves his cell until he is shocked to death.

The convicts that I have seen thus dealt with have usually slept soundly the night before, they have entered the room calmly and stolidly, often with a half smile on their lips, some without uttering a word, others repeating a brief prayer, still others with a cheerful good-bye to those present. They usually seated themselves without betraying any signs of fear or trembling, curiously watching the strapping-in process for a while, then sitting erect, looking straight ahead at nothing in particular.

The physician in charge observes the respiratory movements of the prisoner and signals to the electrician at a moment when the lungs contain the minimum quantity of air. At the moment that the contact is made the criminal's body stiffens in a state of tonic muscular spasm, restrained by the straps. This spasm abates somewhat as the voltage is reduced, to again attain its maximum with each raise of voltage. When the current is interrupted the body collapses completely. An examination by the physicians usually fails to elicit any signs of life. Occasionally, there is heard a turbulent, incoördinate, accelerated heart-beat, but apparently limited to the auricular chambers of the heart. In only two cases was there any respiratory effort and this was limited to a single contraction of the thoracic respiratory muscles. An additional brief contact or two regularly abolished these reflex phenomena.

The reason for making the contact at the moment that the convict has expired air from his lungs in the natural course of his breathing is this—and it will explain why certain witnesses of the first electrocution thought that life still existed in Kemmler's body. It must be recalled that there is created a terrifically powerful spasmodic contraction of all muscles, including the sphincters and the glottis.

The closure of the glottis confines whatever air may be in the lungs; upon interrupting the current the body becomes entirely limp, the glottis partly relaxes, the thorax collapses and the contained air rushes through the partly closed glottis. A sound resembling a sigh or half groan may be thus produced upon the body of any dead animal; a little mucus present augments the sound into a gurgle. It is no wonder that inexperienced persons then believe life to be still present.

The death is undoubtedly painless and instantaneous. The vital mechanisms of life, *circulation* and *respiration,* cease with the first contact. Consciousness is blotted out instantly and the prolonged application of the current as it is usually practised by Mr. E. F. Davis, the state electrician of New York, ensures the permanent derangement of the vital functions so that there could be no recovery of these. Occasionally, the drying of the sponges through undue generation of heat causes desquamation or superficial blistering of the skin at the site of the electrodes, but not often. Post-mortem discoloration, or lividity, often appears during the first contact. The pupils of the eyes dilate instantly and remain dilated in death.

The post-mortem examination of "electrocuted" criminals reveals a number of interesting phenomena.

The temperature of the body rises promptly and reaches as high as 120° F. to 129½° F. within twenty minutes in many cases. After the removal of the brain the temperature recorded in the vertebral canal was often over 120° F. The development of this high temperature is to be regarded as resulting from the active metabolism of tissues not (somatically) dead within a body where all vital mechanisms have been abolished, there being no circulation to carry off the generated heat. The maximum heat is generated at the site of the leg-electrodes, where muscle (myosin) coagulation is most extensive. Furthermore, the release of from ten to twenty horse-power of energy within the body must contribute materially to the caloric increase.

The heart, at first flaccid when exposed after death, soon contracts and assumes a tetanized condition. This is particularly marked in the left ventricle; on the whole the organ assumes the form of a heart *in systole.* In one case (Koenig) the right ven-

tricular wall of the heart had ruptured in several places. In one case I was able to elicit slight fibrillar contractions, limited to the small area stimulated, by touching the wall of the heart with a cold instrument. In several cases mechanical irritation of the *atrio-ventricular bundle* elicited slight contractions limited to the columnæ carneæ and the papillary muscles of the left ventricle. In experiments conducted with Professor Coplin upon one of these bodies, this mode of contraction could be called forth by faradaic stimulation, although no response was elicited by direct stimulation. In the same individual it was impossible to elicit any response *via* the nerve system, either through stimulation of the cortex (exposed within about ten minutes), the spinal cord or peripheral nerves, although muscular reflexes could always be called forth by directly stimulating the muscle.

The lungs are usually devoid of blood and weigh only seven or eight ounces avoirdupois each.

The blood is profoundly altered bio-chemically. It is of a very dark, brownish hue, and it rarely coagulates. Either the fibrinogen, or the fibrin-ferment, or both, are destroyed.

The maximum damage is undoubtedly wrought in the nerve system though this is not always manifest. Regarding the histologic changes, reports from various sources vary. There is a general agreement as to the frequent occurrence of capillary hemorrhages, disruptive and destructive for adjacent tissues. In the nerve-cells themselves there appears to be no apparent change, although there must have resulted terrific molecular change. P. A. Fish found vacuoles in one case, but no visible changes in another. Aside from the capillary hemorrhages and the arterial anemia with venous congestion, the brain shows no gross changes of appearance. In a case of accidental death from contact with an alternating current of 1,000 volts for about one half minute, Jellinek found extensive streaks of capillary hemorrhages in the gray substance of brain and spinal cord together with more or less destruction of the nerve cells, extrusion of the cell nucleus, etc.

In the case of Strollo, I have had sections made of the pons, oblongata and spinal cord by my colleague, Dr. Radasch, and these have revealed curious circular areas with a peripheral zone of con-

densation which fades off into the surrounding unaffected areas. The bulk of the central rarified portion shows a delicate network of loose fibrillæ which in all probability are glia fibers. The cellular elements in the rarefied area are few in number though apparently free nuclei are scattered in this portion. These areas follow more or less closely the course of the finer vessels. Many of them contain an unruptured vessel centrally located, while others contain longitudinal sections with the areas arranged in a bead-like manner along such vessel. These areas are larger and more numerous in the pons than in the oblongata and spinal cord and apparently distributed in the longitudinal directions more frequently than in other directions. They seem to resemble gaseous emphysema and are possibly due to the electrolytic liberation of gas in the peri-vascular spaces. One is reminded of the punctures in a piece of paper interposed in the path of the sparks of a static machine.

Through the courtesy of Mr. Wilson H. Brown, Sheriff of Philadelphia, I was permitted to witness a number of hangings and thus was enabled to compare the new method with the old.

The preparations for the execution were always swiftly conducted. Upon this point comparison favors neither method. But after the drop through the trap-door the ensuing seconds and even minutes bear a different tale. In nearly all cases the heart beats for about thirteen minutes. In no case could fracture of a cervical vertebra or rupture of ligaments be determined in the ordinary examination.

In one case only was there no movement of the body after the drop, although the heart beat the usual length of time. This prisoner, a Chinaman, apparently died in syncope or of apoplexy. In others the unconsciousness produced by the first shock of the drop appeared to abate and in several instances there were conscious—or at least semi-conscious—efforts at respiration, efforts to reach the neck where the choking sensation was unbearable, efforts at reaching for a support for the feet manifested by such vigorous efforts that several witnesses fainted at the sight.

They veritably " danced upon the air " until the asphyxia (apnea) became so profound as to blot out consciousness, apparently after one or one and one half minutes in some cases.

The anatomy of hanging has been frequently discussed. A recent publication[1] by Dr. Frederic Wood Jones gives the results of the examination of the bodies of one hundred men executed in Nubia in Roman and Byzantine times. Sixty-two were in one trench, forty in another. They were all adult males, with cords binding the legs and arms trussed to the sides. The hanging rope was still *in situ* on one.

Not a single case of damage to the cervical vertebræ was found. The most commonly found lesion was an oblique opening of the sutures of the skull, so that one portion of the skull, represented by the occipital and temporal bones becomes pulled aside from the other portion, represented by the facial part of the skull and the other temporal bone. The basilar suture in most cases was also disunited. The skulls all gave evidence of blood staining.

This remarkable finding of evidence dating about 2,000 years back, prompted me to examine the head and neck bones of five individuals executed by hanging and sent to the Jefferson Medical College for dissection. In not a single instance could I find a fractured cervical vertebra or a separation of any cranial suture. Death had ensued through strangulation.

The Newgate Calendar and other criminal records are full of instances in which the rope broke and the condemned had to be rehanged and even cases where the head was severed from the body. Furthermore, there are not a few authentic cases of resuscitation and total recovery after hanging.

Compared with hanging as well as other methods, electrocution is the most humane, decent and scientific method of inflicting the death penalty because of its efficiency, quickness and painlessness, and it should be adopted by Pennsylvania as well as every state in the Union. The executions should take place in a building remote from the penitentiaries where other convicts, more or less susceptible to reformation, are confined. The erection of scaffolds in prison corridors or the knowledge on the part of other convicts that an electrocution is in progress has a bad, even brutalizing, effect upon them.

[1] *British Medical Journal,* March 28, 1908.

At the time when objections to the hangman's bungling were most strongly urged in favor of some better method, poisoning by prussic acid as well as chloroform were suggested. With regard to the injection of prussic acid by means of the hypodermic syringe, the Gerry Commission report says:

"This is open to the very serious objection that the use of that instrument is so associated with the practice of medicine, and as a legitimate means of alleviating human suffering, that it is hardly advisable to urge its application for the purposes of legal executions against the almost unanimous protest of the medical profession."

It seems to me that the use of chloroform, first suggested by Wilder in 1870, cheap and efficient as it would be, is open to the same objection. There should be a lively sense of violence, of mysteriously overwhelming power, of potent force and destructive energy attached to the means employed in putting the murderous ruffian out of existence. If any sentimentality is to obtain in relation with capital punishment methods it should not be in favor of the "plug ugly" wielders of the stiletto, black-jack and the ever-ready revolver.

Capital punishment has been abolished in Rhode Island, Maine, Michigan and Wisconsin. Kansas had abolished it but restored it after a negro was burned at the stake for an outrage upon a woman. The states of New York, Colorado and Iowa deemed it wise to reënact the death penalty after it had once been abolished, owing to the increase of crime. (The same experience was met with in Switzerland where the penalty was abolished in 1874 and again established in several cantons in 1879.)

In Louisiana the death penalty is inflicted for assault with intent to kill, arson, burglary and administering poison.

In Delaware and North Carolina arson and burglary are capital crimes.

In Missouri seven crimes are punishable by death; among them are murder, train robbery, arson, perjury in a capital case and mayhem.

In Connecticut the law prescribes the death penalty for placing obstructions on a railroad track.

In Utah the law provides that the condemned may choose between hanging and shooting.

PROC. AMER. PHIL. SOC. XLVII. 188 D, PRINTED JULY 10, 1908.

The question "Is capital punishment justifiable"? has agitated the minds of men ever since the dawn of civilization. Public opinion is never so fickle with regard to any problem of life as this one. My own opinion is a firm conviction in favor of it for those who commit premeditated murder, arson, train-wrecking and bomb-throwing. Society needs this penalty for its own protection and it is authorized to use it. The Mosaic law "Thou shalt not kill" refers to murder and not to legal execution. The fear of death is in most men and it is therefore the most powerful means of intimidation. Optimists may hope to see society organized upon such an enlightened plane that the penalty need not be resorted to—but that time is not yet at hand. In nearly every county or state which abolished the penalty, the subsequent increase in crime aroused a clamor for its reëstablishment.

The opinion is held by some that the penalty fails to act as a deterrent for others. The argument is puerile, for this country at least, inasmuch as only 1.3 per cent. of homicides are convicted. In Germany 95 per cent. are convicted, or, proportionately, thirteen times as many. Were the penalty as rigorously enforced in the case of murder as the whipping-post is used in Delaware for various crimes, its deterrent effects would soon become manifest. It is idle to talk of anything but prompt punishment as a deterrent of crime.

Thus, in New York City, in 1904, there were 147 first degree murders; but there were only 27 convictions and only two were executed. In the same year, in Philadelphia, 48 murder trials resulted in only 7 verdicts of murder in the first degree and several of these, on re-trial, received minor sentences. London, with 6,000,000 inhabitants, had 24 murders; 9 were hanged therefor. Chicago, with 2,000,000 inhabitants, had 128 murders; only 1 was hanged.

The tardy justice meted out to murderers is the most deplorable feature of our legal machinery to-day. There are too many loopholes for escape—long delays, endless appeals, lots of slush about the "unwritten law," numerous legal technicalities and sentimental juries. By the pettifogging of criminal law the great majority of cases are granted new trials in the United States; in Great Britain only 3.5 per cent. Nearly always the appeal is based upon points of pleading and practice and many years elapse before the final settle-

ment of the case. Our administration of justice has degenerated into a sort of "rose-water penology." Its demoralizing effect upon the community is manifested by the rapid increase of crimes of violence among juveniles, so ready to imitate and emulate their seniors in crime. We have become too much accustomed to failure of justice in murder cases. This blot upon our civilization is largely the outcome of our indifference to the way many criminal courts are conducted. Certain magistrates make a farce out of serious business, lawyers wrangle with each other unchecked, witnesses are brow-beaten and bribery and corruption of political complexion degrade the proceedings to the level of a saloon or gambling-den or a policy-shop rather than a court of law.

The explanation is sometimes given that "hard times" influence this appalling increase of crime. That this is not so can be readily shown by reference to statistics. I would rather point to the moral deterioration indicated by the manner in which large sums of money are stolen or used for bribery and corruption and the luxury and reckless extravagance with which some wealthy persons (who ought to be in the penitentiary) offend the decent class of our population. Add to this the manner in which the newspapers set forth the details of brutal crimes and breed familiarity with thoughts of crime.

Society has relaxed too much. The death penalty is a necessity and must not be abolished, else all discipline of society will be relinquished. Though society "revolts at the old religious dogma of the retribution of hell, the church still retains it as essential in its terrible dissuading appeal to the imagination of men" (*New York Sun*). Let us, therefore, in our penology, adhere to what the test of time has proven to be an efficient check if only it be carried out as has been done in Germany and Great Britain.

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